# Local grid refinement for free-surface flow simulations

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## Propositions

accompanying the thesis

# Local grid refinement for free-surface flow simulations

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1. Modeling errors and measurement uncertainties are of *zero*th order magnitude in terms of the grid spacing.
2. The interface discretization C3, presented on pp. 80-3 of this thesis, is an example of a *quasi-simultaneous* coupling method. By iteratively updating the velocity field and re-applying a pressure Poisson correction, it can be made identical to its fully implicit or *simultaneous* counterpart C2 (pp. 79-80).
3. It is convenient if steady-state solutions do not depend on the time step size or the time integration scheme. Interface scheme C3 (pp. 80-3) does satisfy this property if expressed in terms of pressure updates $\delta p$, but not if expressed in terms of pressure values $p$.
4. Variation on a quote of J.W. Reeves[1] on software development: *Grid design* is still more a craft than an engineering discipline. This is primarily because of lack of rigor in the critical processes of validating and improving a grid.
5. *Auto-completion* nowadays is widespread in (online) software, therewith influencing many aspects of science, society and personal life. If properly used, auto-completion reduces errors, helps to focus on problems that really matter and broadens your perspective. If misused (or abused), it reduces language awareness, distracts, and restricts (or filters) your world perspective.
6. *Multilingualism* helps to expand your personal horizon and increases the capacity to approach problems from different points of view. This observation applies to spoken languages (or dialects), but just as well to scientific disciplines, engineering schools, programming languages, et cetera.
7. It is not uncommon in modern society to take an economic view of personal achievements by maintaining bucket lists or by obsessively exploiting personal time, money and possessions (and eventually boasting about it).
8. *Supra-convergence* is an often-occurring property of numerical discretization methods (pp. 61 ff.). Unfortunately, supra-convergence is rarely – though not never – observed in households, society, politics, academic research, engineering, and so forth.

[1] J.W. Reeves, "What is software design?", in: C++ Journal, Vol. 2, No. 2. 1992